Appl. No. 10/707,244
Amdt. dated May 22, 2006
Reply to Office action of March 03, 2006

REMARKS/ARGUMENTS

1. Rejection of claims 1-7:

Claims 1-7 are rejected under 35 U.S.C. 102(e) as being unpatentable by Shi et al.
5   (US pub. No.: 20040139418) for reasons of records, as cited in pages 2-4 of the
above-identified Office action.

Response:

According to claim 1, the main characteristics of this application comprise: (a)
10   collecting an assist feature bias of a predetermined assist feature which will be added to
the photomask layout; (b) performing a rule-based OPC process by taking account of the
assist feature bias to compute a target bias of the photomask layout; (c) outputting a
corrected photomask layout according to the target bias; and (d) *adding the*
predetermined assist feature to the corrected photomask layout to complete the design of
15   *the photomask layout.* Therefore, the assist feature (such as scattering bars) added last is
not corrected by the rule-based OPC process such that the spacing between the assist
feature and the photomask pattern can be effectively controlled during the whole
correction process. As a result, the limitation of adding the assist feature, such as
scattering bars, of the prior art, or the situations of exposing the assist feature on a
20   semiconductor substrate can be avoided. Furthermore, the parameters of scattering bars
are taken into account and input into the rule-based OPC software in the beginning of the
process. In this way, the scattering bars last added to the photomask layout result in a
preferable exposing effect, especially improving the process window of the isolation
region (para. [0036]).
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Referring to the prior art, the main contents of the application of Shi et al. teach

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generating a general rule of an automatic optical proximity correction. On the one part, two kinds of OPC rules are generated according to a given illumination setting and a given photomask pattern respectively, then the two OPC rules are combined and stored serving as a general OPC rule for various photomask pattern (abstract, Fig.1). On the

5   another part, the prior art method of correcting a photomask pattern includes: (1) providing a photomask pattern; (2) *analyzing each feature within the photomask pattern so as to determine if the feature is identified in the OPC table containing the above-mentioned rules*; (3) *if the answer in step (2) is true, modifying the feature in accordance with the biasing requirement or scatter bar in the table;* (4) continuing the

10   process until all features within the photomask pattern have been analyzed and modified if necessary. Accordingly, the main object of Shi's application is that once the OPC rules or table have been generated in the manner, it is possible to automatically modify a photomask pattern design to include OPC techniques *without any further input from a photomask designer* (Summary, para. [0066], and Fig.5). According to Fig.5, para.

15   [0064]-[0066], and steps 54-55, those skilled in the art may realize that Shi's application teaches *analyzing and modifying only one feature of the photomask pattern each time sequentially by adding the assist features, such as scattering bars, into the feature of the photomask pattern when performing the rule-based OPC, and the overall correction is completed after all the features within the photomask pattern is analyzed and modified in*

20   *order so as to finish the design of the photomask pattern design.* On the other words, *the assist features are added into the photomask pattern during performing the rule-based OPC for performing the rule-based OPC process.* Therefore, the functionality of the assist features added during the OPC process for each photomask pattern feature in Shi's application is only similar to that of "the second assist feature" in claim 6 of this

25   application, not to the functionality of "the predetermined first assist feature" of claim 1 of this application at all. As a result, Shi's application only discloses the characteristics (a), (b) of claim 1 and the content of claim 6 of this application, which is how to generate an OPC rule set, and the performing process of a conventional rule-based OPC. However,

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there is an obvious difference between the prior art and this application that *Shi teaches adding all the assist features, such as scattering bars, during performing the rule-based OPC but the first predetermined assist features (such as scattering bars in claim 2) are added in the end of the correction process, after the rule-based OPC process, according*
5   *to claim 1 of this application.*

Furthermore, *Although Shi teaches collecting assist feature bias to generate an OPC rule set, he never mentions or discloses outputting a corrected photomask layout after the rule-based OPC process and then adding predetermined assist features into the outputted*
10   *corrected photomask layout to complete the design of the photomask pattern.* Therefore, applicants believe the spirit, object, and process steps of Shi's application are quite different from this application. In addition, Shi's application cannot achieve the advantage of avoiding exposing assist features onto a target substrate and controlling the bias of assist features to improve the process window set forth. Accordingly, applicants
15   assert claim 1 of this application should be patentable with respect to Shi's application. Reconsideration of claim 1 is politely requested.
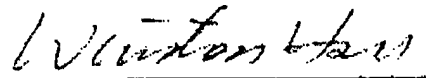
Regarding claims 2-7, since they are all dependent upon claim 1, claims 2-7 should be allowable if claim 1 is allowable. Reconsideration of claims 2-7 is hereby requested.
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Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

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Sincerely yours,

Date: _____ 05/22/206 _____

5   Winston Hsu, Patent Agent No. 41,526

P.O. BOX 506, Merrifield, VA 22116, U.S.A.

Voice Mail: 302-729-1562

Facsimile: 806-498-6673

e-mail : winstonhsu@naipo.com

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